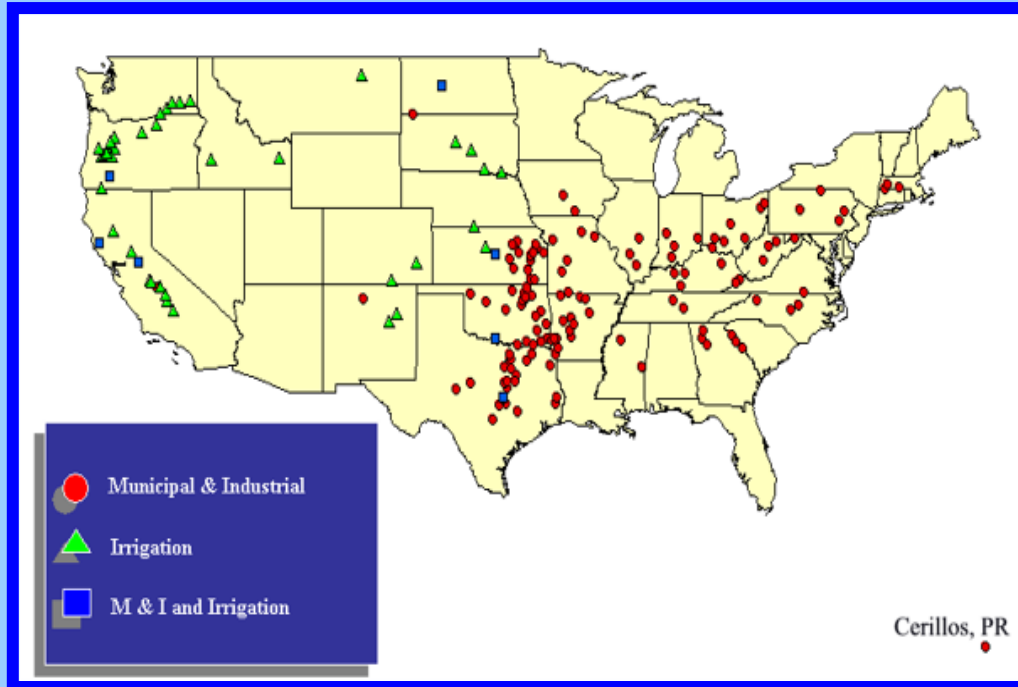




US Army Corps
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The Corps of Engineers

Water Supply Program



- **Authorities, Policies and Procedures**
- **Scope of Corps WS**
- **Economic Analysis**
- **Future Directions**

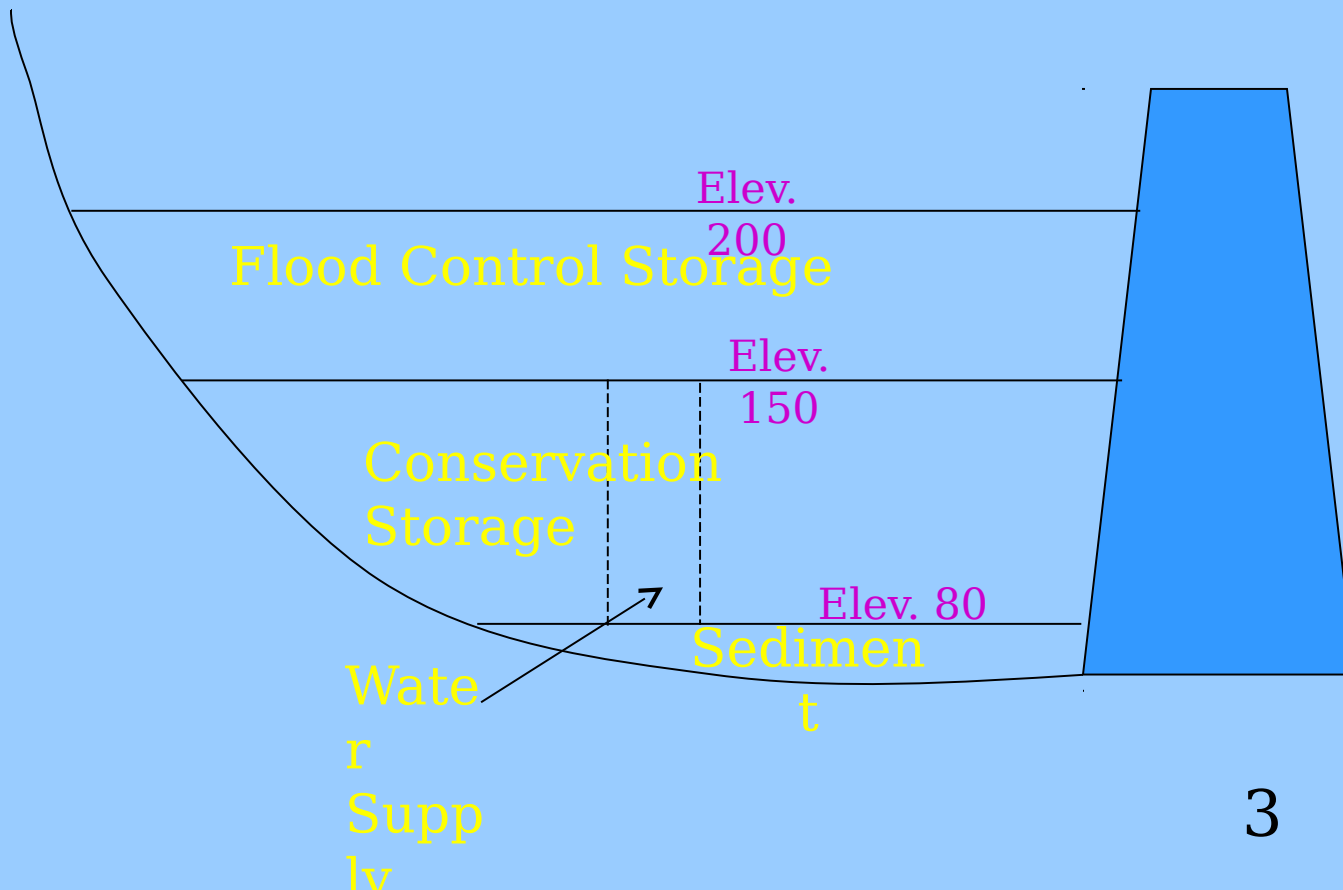
Presented by:
Steve Cone
Institute for Water
Resources

**Economic Analysis for Water
Resources
Alexandria, VA
March 2009**

Learning Objectives

- The Corps' primary water supply authorities and policies
- The magnitude of the Corps' M&I water supply program
- Economic Analysis of WS
- Reallocations of Storage

Water Supply in a Multipurpose Project



WATER SUPPLY

Primary Authorities

- Section 6 of the Flood Control Act of 1944
(surplus water)
- Section 8 of the Flood Control Act of 1944
(irrigation water)
- **The Water Supply Act of 1958**
(storage space)
- Project Specific Authorities

WATER SUPPLY

Primary Authorities

Sec. 6, 1944 FCA: (Surplus Water)

- **Sec Army can enter into agreements for surplus water with states, municipalities, private entities and individuals.**
- **Surplus is defined as:**
 - **water not required for the original purpose because the need never developed or the need was reduced by changes in demand.**
OR
 - **water which would be more beneficially used as M&I than for the authorized purpose and which when withdrawn would not significantly affect authorized purposes over some specific time period.**
- **Prices and terms are as the Secretary deems reasonable. We use the same pricing system that is used for reallocations.**
- **Amounts of water are normally small.**
- **Contracts for 5-years with option for renewals with updated costs.**
- **Agreements for M&I but not for crop irrigation.**

WATER SUPPLY

Primary Authorities

Agricultural Water

- **Western States with DOI water facilities**
 - **Sec. 8, 1944 FCA for Western States**
 - **Include irrigation in Corps lakes in 17 contiguous Western States upon recommendation of Sec DOI and in conformity with Reclamation Law.**
 - **DOI constructs, operates and maintains irrigation works and enters into agreements for use of storage.**
- **Eastern States**
 - **Section 103(c)(3) of WRDA '86; Cost shared at 35% of costs + 100% OMRR&R**
- **In Western States - if no BUREC facilities**

WATER SUPPLY

Primary Authorities

Title III, 1958 R&HA, “The 1958 Water Supply Act”: (Water Supply Storage)

- **Act states that water supply is primarily a state and local responsibility.**
- **Include M&I water supply storage in new reservoir projects.**
- **Reallocate storage in existing projects to M&I water supply.**
- **Modification of projects to add M&I that would seriously affect other authorized purposes require congressional authorization (POLICY: 50,000 AF or 15% of total storage)**
- **All costs to be repaid by the non-Federal sponsor. Time of repayment varies depending on when authorized.**

WATER SUPPLY

Repayment of Costs under 58

Act,

as amended

- **Old Projects (pre-WRDA 86)**
 - **Contracts signed prior to 1986** - 50 years with 1958 interest rate formula
 - **Contracts signed after 1986** - 30 years with 1986 interest rate formula
- **New Projects (post WRDA 86)**
 - **Law permits 30 years** - policy requires to be paid during period of construction
- **Reallocations**
 - **New construction costs** - paid during period of construction
 - **Storage costs** - 30 years with 1986 interest rate formula
- **All “Plumbing” Facilities are Non-Federal**
(conveyance, treatment, distribution facilities, etc.)
- **No single purpose water supply reservoirs**
 - at least 20% of benefits from FRD, Nav., Env.
 - Single purpose modifications to existing projects, O.K.

WATER SUPPLY Guidance

- **ER 1105-2-100 PGN, dated April 2000**
 - ✓ **Paragraph 3-8**
 - ✓ **Appendix E, Section VIII**
- EP 1165-2-1 Policy Digest, dated July 1999
 - ✓ Chapter 18
 - ✓ http://www.usace.army.mil/cw/cecw-cp/library/CWPocketReference_14Nov05.pdf
- IWR Report 96-PS-4 Water Supply Handbook
 - ✓ Chapters 2, 4 and 5

WATER SUPPLY

Reallocation Policy

Under 1958 Act

- **Applies to Existing Pre-86 Act Projects**
- **Sponsors obtain Permanent Right to Storage**
- **Cost based on higher of updated cost of storage, revenues foregone, or benefits foregone**
- **WRDA 86 interest rate formula over a repayment period of 30 years**
- **Any new construction costs paid upfront**

WATER SUPPLY

Secondary Authorities

- **PL 75-208, 1937 - receipt of contributed funds**
- **PL 88-140, 1963 - permits locals to have permanent rights to storage as long as they continue with OMRR&R**
- **Section 22 of WRDA 74 (PL 93-251) - planning assistance to states**
- **Sec. 82 of WRDA 74 and 1974 Disaster Relief Act - emergency supplies of clean water**
- **Section 931 of WRDA 1986 (PL99-662) - unused M&I water can be used temporarily for irrigation**
- **Section 322 of WRDA 90 (PL 101-640) - provides for a reduced price where cost of reallocated storage has been priced at the updated cost method**

Authorities, Policies and Procedures POP Quiz

- Where in the PGN are the water supply policies and procedures located?
- How many primary water supply authorities are there and which one is used to the greater extent?
- How many years does a sponsor have to repay their water supply cost?

WS Overview

Municipal and Industrial Water Supply (2007 data)

Storage Space: **9.38 million acre-feet**

Reservoirs: 134 reservoirs

Location: 26 States and Puerto Rico

24 of the Corps 38 districts

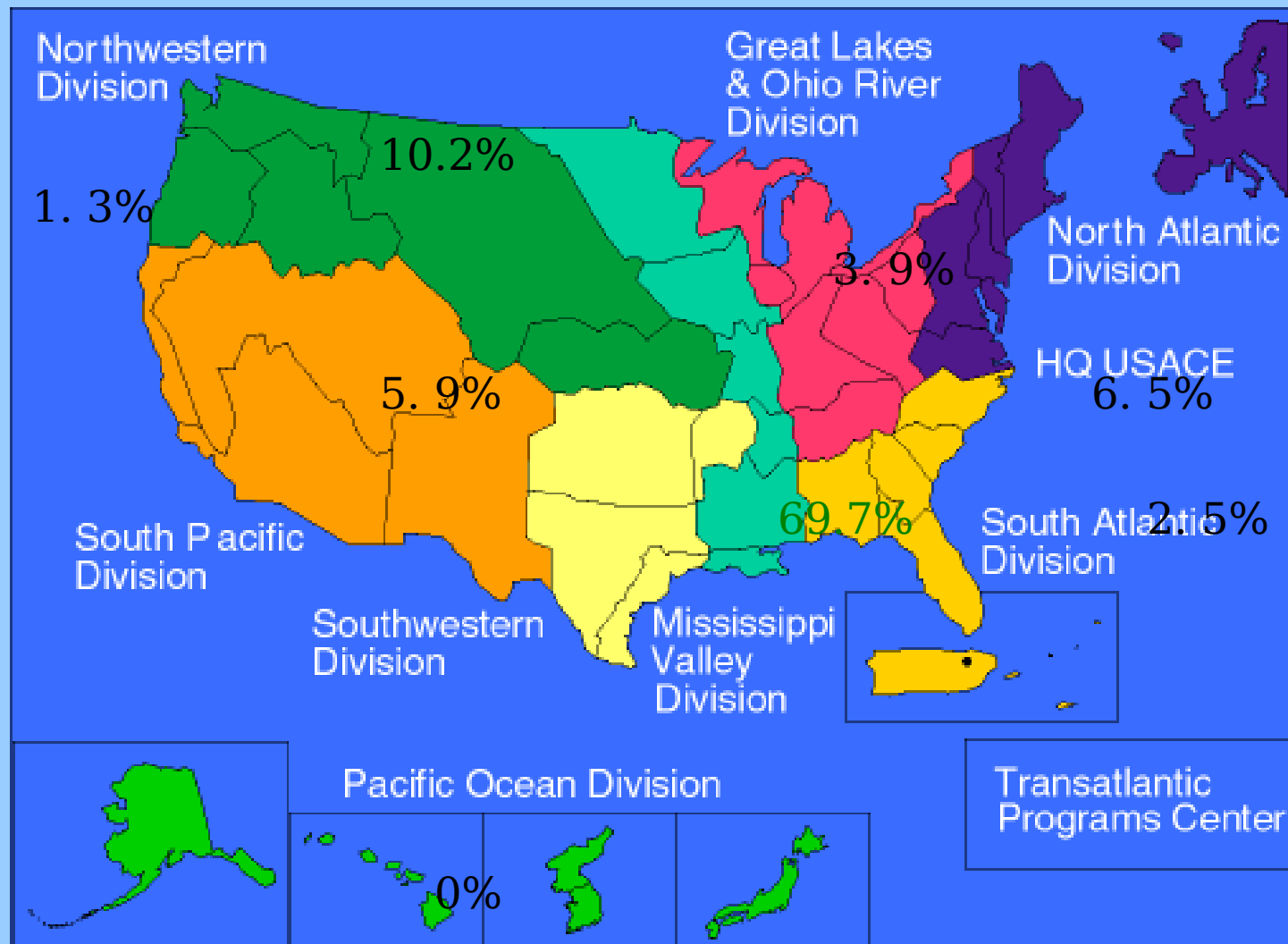
Investment Cost: **\$1.28 billion**

No. Agreements 316 covering 9.08 million
acre-feet

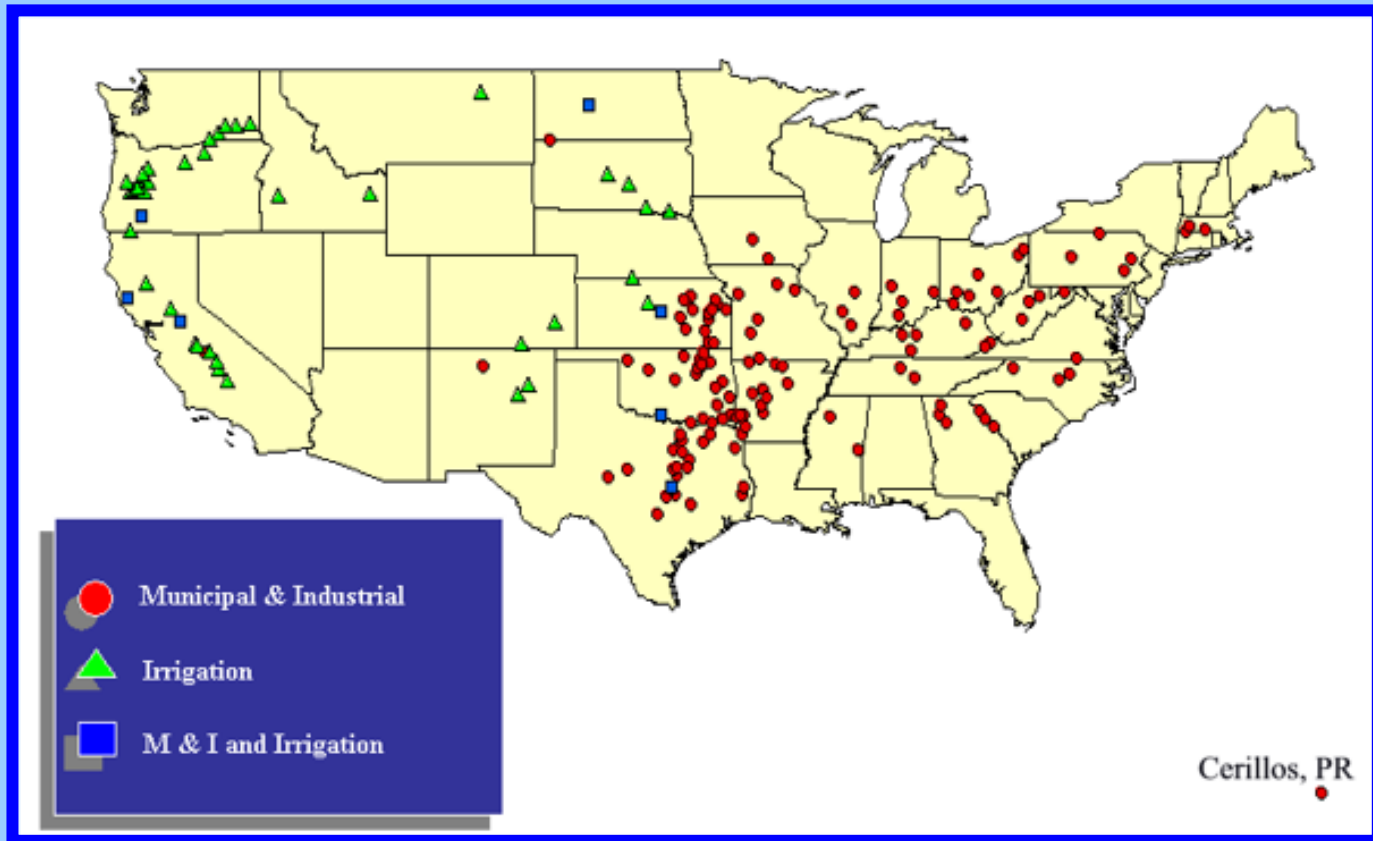
Irrigation Water Supply (2004 data)

56.6 million AF of storage for irrigation and other uses in 48
reservoirs in the West (only 640,000 of which is specific
irrigation)

Distribution of M&I Storage Space by MSC (%)

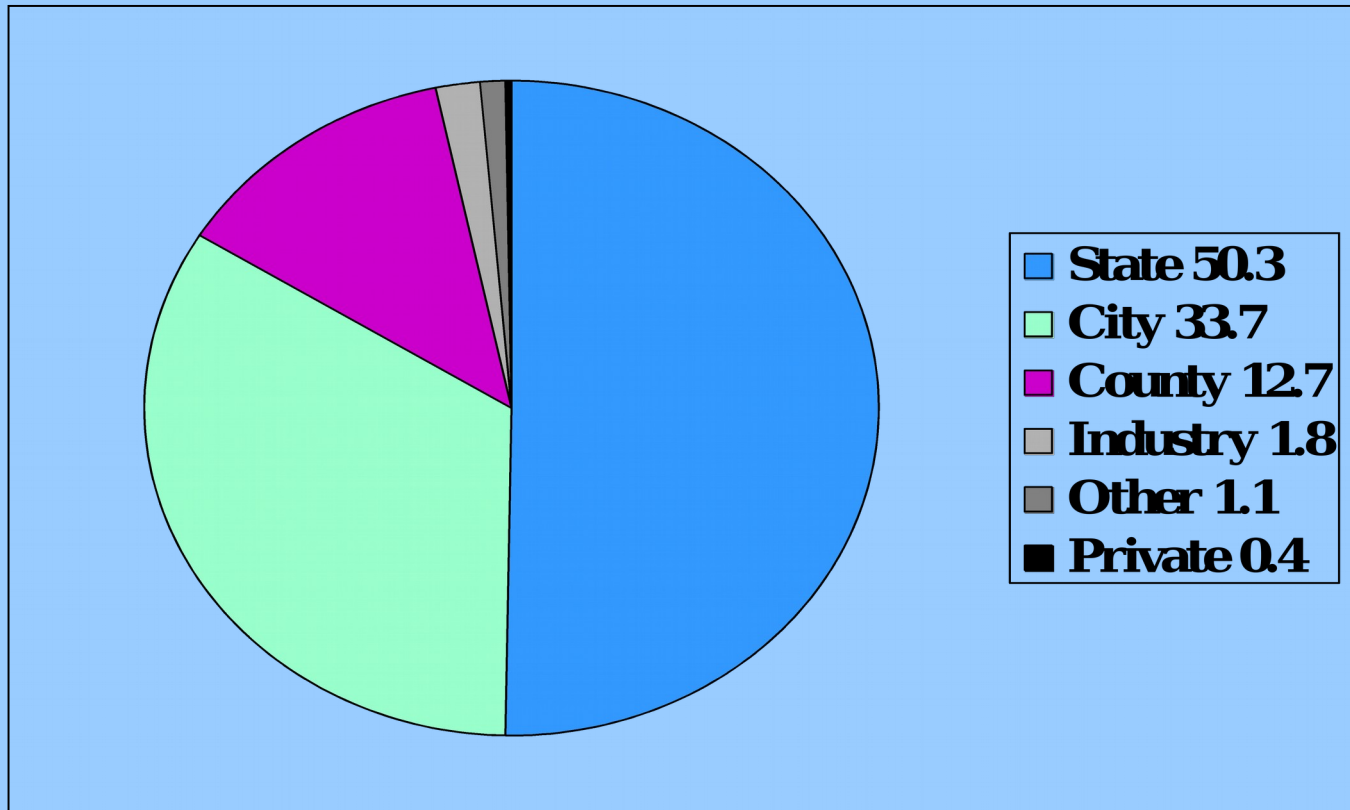


M&I and Irrigation Projects Location and Data



www.vtn.iwr.usace.army.mil
Water Supply / Fast Facts

% of M&I Storage Space by Type of Non-Federal Sponsor



**States with 50.3% have the majority of
storage space**

Scope of Corps WS

- POP Quiz -

1. Approximately how many million acre-feet of M&I storage are in Corps reservoir projects?
2. In what MSC is the majority of this storage located?
3. Which type of entity has the most M&I storage space in Corps projects?

Conceptual Basis For Water Supply NED Benefits

- **From the P&G:**
- Society's willingness to pay for the increase in the value of goods and services attributable to the water supply. **Where the price of water reflects its marginal cost**, use that price to calculate willingness to pay.

Conceptual Basis For Water Supply NED Benefits

- Water Supply **is normally priced on the average**, not on the margin. So, must use one of the other accepted methods described in P&G.

Willingness To Pay Benefit Estimation Approaches

- Actual or simulated market price
- Change in net income
- **Cost of the most likely alternative**
- Administratively established values

Benefit Analysis - Steps

- **Step 1** - Identify the Study Area
- **Step 2** - Estimate Future M&I Water Supplies
- **Step 3** - Project Future M&I Water Demand
- **Step 4** - Identify the Deficit Between Future Water Supplies and Demand

Benefit Analysis – Steps (Cont.)

- **Step 5** - Identify Alternatives Without Federal Plan
- **Step 6** - Rank and Display the Alternative Plans Based on Least Cost Analysis
- **Step 7** - Identify the Most Likely Alternative
- **Step 8** - Compute M&I Water Supply Annualized Benefits

Water Supply - Reallocations

- Reallocate storage at existing reservoirs
- Key element is definition of costs of storage to new water supply user

Opportunities for Reallocation

- Reallocation of Flood Control Storage
- Reallocation of Conservation Storage
 - Water Quality
 - Hydropower
 - Other
- Reallocation of Sediment Pool

REALLOCATION

Summary of Reallocation Agreements 1965 - 2007

Reallocated From	Number of Agreements	Storage Reallocated (acre-feet)
Hydropower	41	221,127
Flood Control	51	302,136
Conservation	7	27,185
Water Quality	7	125,125
Other & NA	17	178,800
Total	123	854,373

Reallocations:

Economic Evaluation Concepts

- Identify and measure benefits and costs using “with and without” principle
- Benefit is most-likely, least costly alternative
- Apply opportunity cost concepts to determine NED costs (e.g. what is foregone? What resources are needed?)

Price of Reallocated Storage

Highest of:

1. Benefits foregone
 - opportunity costs from economic evaluation
2. Revenues foregone
 - revenues to Treasury lost due to reduced power production (current power rates)
3. Updated cost of storage in the Federal reservoir

Price of Reallocated Storage (cont.)

3. Updated Cost of Storage =

$$\frac{(TC - SP) \times \text{Storage reallocated (ac-ft)}}{\text{Total usable storage space (ac-ft)}}$$

TC = total costs of construction updated using Civil Works Construction Cost Index System (CWCCIS) and ENR

SP = specific costs = costs of identifiable project features for a specific purpose updated using CWCCIS and ENR

COSTS FOR REALLOCATED STORAGE

- Storage Space:
 - Average \$530 Ac/Ft of space
 - Range from \$100 to \$4,500 Ac/Ft of space
- Yield:
 - Average \$250 Ac/Ft/Yr of yield
 - Range from \$50 to \$1000 Ac/Ft/Yr of yield

Water Supply Economic Analysis for Reallocations

- **Inputs:**

- Water demands
- Cost of most likely alternative
- For reallocations:
Need the effects on existing project purposes
- Updated project costs

- **Outputs:**

- Net NED benefits
- Benefit to cost ratio
- Price of water supply storage (\$/acre-foot)
- Info for water supply contract

Reallocation Report Evaluations

1. Water supply demand analysis
2. Storage-Yield analysis
3. Analysis of alternatives to meet net demands
4. Cost of modifications/mitigation
5. Cost/Price for storage determination
6. Determination of Compensation to Others
7. NEPA Analysis/documentation
8. Public participation and public interest review documentation

Summary of Economics and Reallocations

- Benefits based on the most likely alternative
- Reallocation studies are the most common Corps water supply study
- Price of reallocated study based either on benefits foregone or updated price of storage

Water Supply Business Line Managers

❖ **Headquarters - Ted Hillyer IWR**

❖ **MSCs**

- William Sutyak - NAD**
- Terry Stratton - SAD**
- Ronny Sadri - LRD**
- Kevin Curran - MVD/MVS**
- Jim Fredericks - NWD**
- Adrienne Carter - SWD**
- S.T. Su - SPD**
- Helen Stuppelbeen - POD**

Future Directions

Trends - *Associated*

Uncertainties

- **Increase in population and economic growth**
 - *Uncertainty about growth rates*
 - *Potential for large shifts of water demand*
- **Increasing in-stream demands**
 - *Public resolve on environmental values*
- **Global warming and climate change**
 - *Pace and form of climate change*
 - *Impacts on water resources*
- **Demand for water for energy production**
 - *Selection of fuel alternatives (liquefaction or biofuel types)*
- **Aging water supply infrastructure**
 - *Budget priorities in funding for rehabilitation*

Future Directions

Other trends and Uncertainties

- Increased demands for reallocations and modifications
- Risk and Reliability based Yield evaluations
- Unquantified Indian water right claims
- Increase Water Transfers
- Development of new water supply and transmission infrastructure
- Increasing investment in water desalination
- Groundwater recharge and recovery
- Reclamation of wastewater and impaired water

Things in the Pipeline that may Alter Reallocation Policies

- **Left out of WRDA 2007.** Take the lower of updated cost of storage, benefits or revenues foregone or replacement cost. – Congress requests dialogue on WS pricing.
- **Lake Lanier, GA.** This has to do with reallocating storage in Lake Lanier and the law suit among GA, AL and FL on the ACT/ACF. Actions here may further define Corps discretionary authority under WSA 58.
- **Chatfield, CO.** This is an issue with reallocation of less than reliable storage in Corps reservoirs in CO. May affect pricing policies for less than reliable supplies.
- **Water Supply Portfolio Analysis FY08/09** – To help prioritize WS study investments and may alter financing for study costs.

Water Supply Assistance

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Policy Compliance Reviewer
- **Janet Hotubbee - CESWT-PE-P: 918-484-5135,**
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- **Peter Shaw - CESWD-PDS-P: 469/487-7038**
Technical POC for the Water Management &
Reallocation Center of Expertise
- **Steve Cone - CEIWR-GW:**
WS Knowledge Expert **571/212-0087 (cell)**
- **Ted Hillyer - CEIWR-GR: 703/428-6140**
HQ WS Business Line Manager



***Whiskey's
for
drinkin':***

***water's
for
fightin'***

***--Mark
Twain***

Questions ?